Claims

1. A capsule
- having a diameter of less than 100 µm, and
- an envelope which comprises at least three polyelectrolyte layers, with at least one of these three polyelectrolyte layers being labeled with at least one dye.

2. A capsule as claimed in claim 1, characterized in that two of the three polyelectrolyte layers are in each case labeled with at least one different dye, with the two polyelectrolyte layers which are labeled with a different dye being separated from each other by at least the third polyelectrolyte layer which is not labeled with dyes.

3. A capsule as claimed in claim 2, characterized in that the third polyelectrolyte layer, which is not labeled with dyes, has a thickness of between 0.1 nm and 10 nm.

4. A capsule as claimed in claim 2 or 3, characterized in that the third polyelectrolyte layer, which is not labeled with dyes, is a sensitive layer which either swells or shrinks, with its thickness thereby being altered, when its environmental conditions change.

5. A capsule as claimed in claim 4, characterized in that the environmental conditions are the pH, the salt concentration, the temperature, adsorbed components, enzymes, the concentration of a substance, physical parameters, components which affect the solvent or which react with the sensitive layer, and also miscible solvent constituents.

6. A capsule as claimed in one of claims 2 to 5,

characterized in that the different dyes are a dye of higher absorption energy (donor) and a dye of lower absorption energy (acceptor).

7. A capsule as claimed in one of claims 2 to 6, characterized in that the different dyes are coordinated with each other such that it is possible for a Förster (fluorescence) resonance energy transfer (FRET) to take place between the different dyes.

8. A capsule as claimed in one of claims 2 to 7, characterized in that additional polyelectrolyte layers, which are not labeled with dyes, are located between the polyelectrolyte layers which are labeled with dyes, and alongside the third polyelectrolyte layer which is not labeled with dyes, or else the third polyelectrolyte layer which is not labeled with dyes for its part consists of several polyelectrolyte layers.

9. A capsule as claimed in one of claims 2 to 8, characterized in that the sensitive layer is an organic polyelectrolyte layer.

10. A capsule as claimed in claim 1, characterized in that the dye is covalently linked, at high concentration, to a sensitive material.

11. A capsule as claimed in claim 10, characterized in that the sensitive material is a material which either swells or shrinks, with its volume thereby being altered, when its environmental conditions change.

12. A capsule as claimed in claim 11, characterized in that the environmental conditions are the pH, the salt concentration, the temperature, adsorbed components, enzymes, the concentration of a substance, physical parameters, components which affect the solvent or

which react with the sensitive material, and also miscible solvent constituents.

13. A capsule as claimed in one of claims 10 to 12, characterized in that the concentration of the dye is so high that the dye forms dimers, aggregates or excimers with itself, which latter lead to self-quenching of the fluorescence or to the formation of a new emission band.

14. A capsule as claimed in one of claims 10 to 13, characterized in that the concentration of the dye satisfies the relationship
mass of sensitive material:mass of dye < 500:1.

15. A capsule as claimed in one of claims 10 to 14, characterized in that the dye-labeled layer has a thickness of from 1 nm to 1 µm.

16. A capsule as claimed in one of claims 10 to 15, characterized in that the polyelectrolyte layer which is labeled with dyes is an organic polyelectrolyte layer which is labeled with dyes.

17. A capsule as claimed in one of the preceding claims, characterized in that the dyes are fluorescent dyes or emitting nanoparticles.

18. A capsule as claimed in one of the preceding claims, characterized in that it is hollow and macromolecules are located in its internal space which is delimited by the envelope.

19. A capsule as claimed in one of the preceding claims, characterized in that the envelope is permeable to molecules of up to a given size.

20. A capsule as claimed in one of claims 1 to 17,